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New records of *Ochrolechia* and *Placopsis* from the Hengduan Mountains, China

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Abstract—Based on specimens collected in the Hengduan Mountains, *Ochrolechia laevigata* is recorded as new to Asia, *O. africana* as new to China, and *Placopsis gelida* as new to mainland China.

Key words — *Ochrolechiaceae*, *Trapeliaceae*, taxonomy, Yunnan

Introduction

Ochrolechia A. Massal. (*Ochrolechiaceae*, *Pertusariales*, *Ascomycota*), a widespread genus of crustose lichens, comprises about 60 species worldwide (Verseghy 1962; Howard 1970; Brodo 1987, 1991; Lumbsch et al. 2003; Kirk et al. 2008; Kukwa 2009, 2011). In China, 25 species have been reported (Wei 1991, Jia & Zhao 2003, Jia et al. 2008), of which 18 are known from Southwest China. During our study of lichens collected from the Hengduan Mountains, we recorded *O. africana* for the first time from China and *O. laevigata* for the first time from Asia. We also collected in the same area *Placopsis gelida,* reported here as new to mainland China.

Materials & methods

The specimens studied are preserved in SDNU (Lichen Section of Botanical Herbarium, Shandong Normal University). The morphological and anatomical characters of the specimens were examined under a stereomicroscope (Olympus SZ) and a polarizing microscope (Olympus CX21). The lichen substances were identified using the standardized thin layer chromatography techniques (TLC) with C system (Orange et al. 2010) and mercury cadmium telluride [MCT] crystal analysis. Photographs were taken of the morphology with an Olympus SZX16 stereomicroscope and of the anatomy with an Olympus BX61 compound microscope with DP72.

New records

Ochrolechia africana Vain., Ann. Univ. Fenn. Aboënsis, ser. A, 2(3): 3. 1926. Fig. 1

Morphology — Thallus crustose, yellowish grey to grey, thin to thick and verruculose to verrucose; isidia and soredia absent; apothecia sessile, numerous, 1.0–1.8 mm in diam.; disk light yellowish pink to light orange, with white and scabrose pruina; thalline margin usually concolorous with the thallus, margins thick, dull, smooth, often prominent; epithecium pale brown; hymenium 220–330 μm high; hypothecium 35–40 μm high; excipulum proprium 15–25 μm; amphithecium with a thick, well-developed medulla, sometimes with small crystals, and thin cortex (30 μm thick); algal layer virtually continuous below hymenium or sometimes sparse; asci 8-spored; ascospores simple, ellipsoid, 55–62.5 × 30–32.5 μm; pycnidia absent.

Spot tests — Thallus cortex K–, C–, KC–; medulla K–, C+ red, KC+ red; apothecial disk K+ yellow, C+ red, KC+ red; apothecial margin cortex K–, C–, KC–; apothecial margin medulla C+ red; thallus UV–.

Secondary metabolites — Gyrophoric acid with traces of lecanoric and 4-*O*-methylhiascic acids.

Distribution & habitat — *Ochrolechia africana* is a pantropical species, reported from southeastern coastal plain, tropical and subtropical areas in

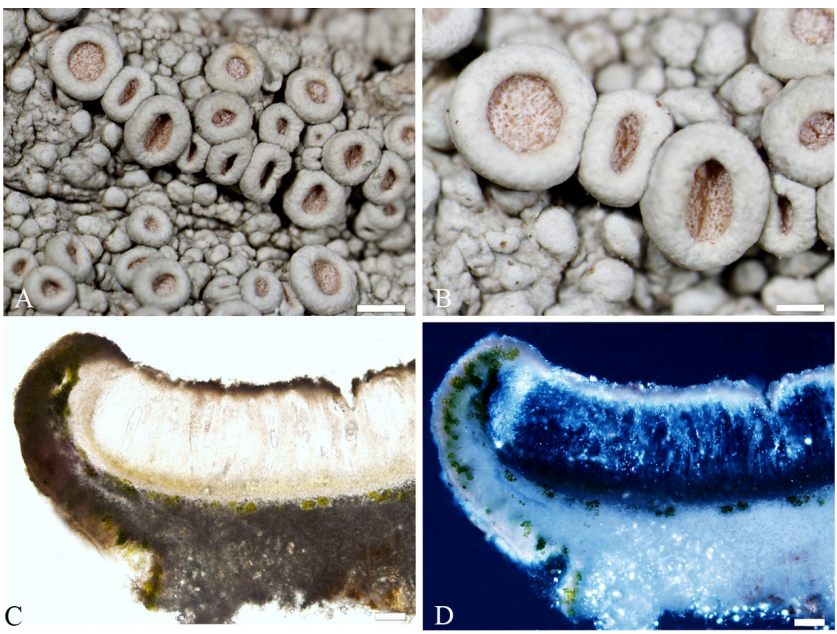

Figure 1. *Ochrolechia africana* [Z.J. Ren 20113910]. A. Thallus. B. Apothecia. C. Apothecial section. D. Crystals in apothecial section. Scale bars: A = 1 mm; B = 0.3 mm; C, D = 100 μm.

North and South America, Asia, Australia, and southern Africa (Awasthi & Tewari 1987, Brodo 1991, Aptroot & Feijen 2002, Roemer et al. 2004). The species grows on wood and the bark of deciduous trees.

Specimen examined — **CHINA. Yunnan**. Lijiang county, Mt. Laojun, alt. 2800 m, on bark, 5 Nov. 2009, Z.J. Ren 20113910 (SDNU).

Comments — *Ochrolechia africana* is characterized by small, pruinose apothecia with smooth apothecial margins, a C+ red medulla due to the production of hiascic acids, and a C– negative amphithecial cortex. The species may be confused with *O. mexicana*, which can be distinguished by a C+ red apothecial cortex, a usually more pruinose disk, and the absence of an excipular ring around the disk (Brodo 1991).

Ochrolechia laevigata (Räsänen) Verseghy ex Kukwa, Lichen Genus *Ochrolechia* in Europe: 132. 2011. Fig. 2

Morphology — Thallus crustose, yellow to pale yellow, shiny, very thin, continuous, thin to moderately thick, not verrucose; apothecia circular, shallow saucer-shaped, usually regular in outline, 1.0–2.4 mm in diam., sessile, light orange, epruinose; thalline margin 0.2–0.6 mm thick, entire, smooth, always concolorous with the thallus; epithecium faintly brownish; hymenium 300–340 µm high; hypothecium about 90 µm high, gray; amphithecium medulla lax, alga layer almost absent, or sometimes only in upper lateral margins not below hypothecium; cortex 45 µm thick laterally, expanding to 100 µm at base; excipulum proprium distinct below hypothecium, 50–60 µm thick; asci 6–8 spored; ascospores simple, ellipsoid, 70–75 × 32.5–40 µm; pycnidia absent.

Spot tests — Thallus cortex K+ yellow, C+ red, KC+ red; medulla K–, C+ red, KC+ red; apothecial disk K–, C+ red, KC+ red; apothecial margin cortex K± yellow, C+ red, KC+ red; margin medulla C+ faintly red.

Secondary metabolites — Gyrophoric acid with a trace of lecanoric acid.

Distribution & habitat — *Ochrolechia laevigata,* which has been previously reported only from the west coast of North America (Brodo 1991, Brodo et al. 2003), grows on deciduous trees.

Specimens examined — **CHINA. Yunnan**. Lijiang county, Mt. Laojun, alt. 4000 m, on bark, 5 Nov. 2009, Q. Tian 20100498, 20100502 (SDNU).

Comments —*Ochrolechia laevigata,* which is characterized by a thin thallus, apothecial margins almost without an algal layer, and a distinct excipulum proprium, resembles *O. oregonensis* and *O. subpallescens* morphologically, but *O. oregonensis* has a thick, verruculose to verrucose thallus while *O. subpallescens* has a continuous algal layer under the hymenium (Brodo 1991). Although our Chinese specimen does not contain olivetoric and 4-*O*-demethylmicrophyllinic

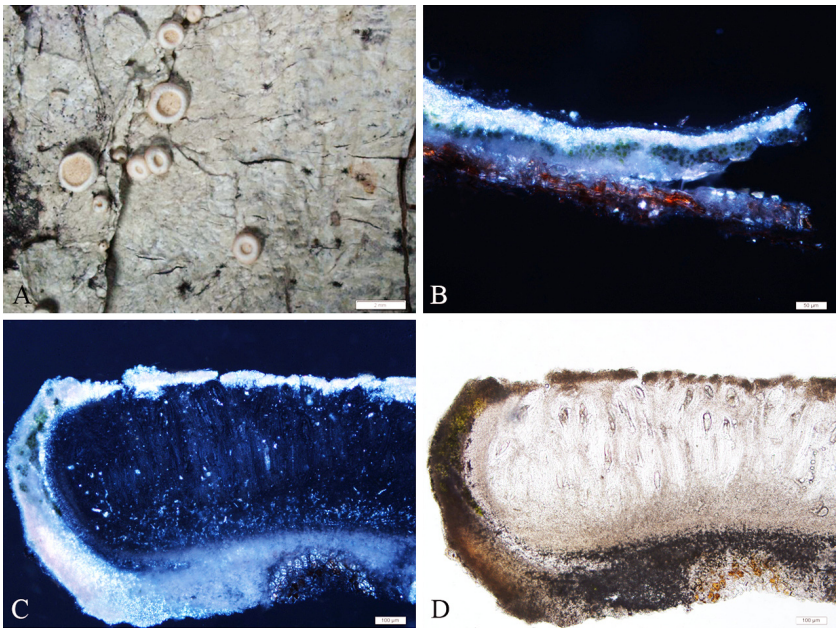

Figure 2. *Ochrolechia laevigata* [Q. Tian 20100498]. A. Thallus. B. Crystals in thallus section. C. Algal layer section. D. Excipulum proprium below hypothecium. Scale bars: A = 2 mm; B = 50 µm; C, D = 100 µm.

acids, it agrees morphologically with the description given by Brodo (1991). The chemical variation of the species may be greater than previously reported and should be studied further.

Placopsis gelida (L.) Linds., Trans. Linn. Soc. London 25: 536. 1866. Fig. 3

Morphology — Thallus dull grey, cream, pinkish or pale brown, forming rosettes; large central with cracked to rimose-areolate part, with radiating marginal lobes, 0.4–1.3 mm wide; surface with pinkish to grey-brown, epruinose, cephalodia deeply plicate, 0.4–4 mm in diam.; soralia farinose green-grey to grayish, generally delimited by a sharply defined and slightly raised margin; apothecia 0.7–1.8 mm in diam., sessile, pinkish to yellow-brown, often with whitish pruinose; asci 8-spored, cylindrical, thin walled; ascospores colourless, simple, ellipsoid, 15–17.5 × 8–10 µm.

Spot tests — Thallus cortex K–, C+ red, KC+ red; medulla K–, C+ red, KC+ red; apothecial disk K–, C+ red, KC+ red; apothecial margin cortex K–, C+ red, KC+ red.

Secondary metabolites — Contains only gyrophoric acid.

Distribution & habitat — *Placopsis gelida* is a widespread, saxicolous, oceanic to arctic species, reported from both the northern and southern

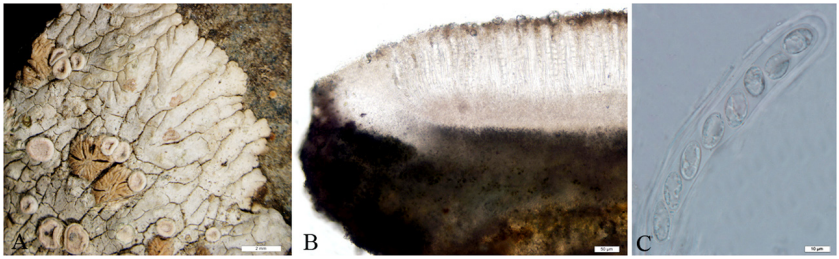

Figure 3. *Placopsis gelida* [Z.T. Zhao 20127934]. A. Thallus. B. Apothecial section. C. Asci and ascospores. Scale bars: A = 2 mm; B =50 µm; C = 10 µm.

hemispheres (Galloway 2007, Smith et al. 2009). It has been previously reported from Taiwan.

Specimen examined —**China. Yunnan**. Dali county, Mt. Cang, alt. 3100 m, on bark, 22 Nov. 2009, Z.T. Zhao 20127934 (SDNU).

Comments —*Placopsis gelida* is characterized by the matte upper surface, pale eroded soralia, deeply lobed cephalodia, and gyrophoric acid as the only major substance. The species is similar to *P. lambii*, which can be separated by its shiny surface, non-lobate cephalodia, and soralia that are usually blackish, sometimes capitate, and greenish (Galloway 2007).

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